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(54) **Reinforcement of coated surfaces of LNP belts**

Verstärkung der beschichteten Seite von Bändern für Langspaltpressen

Renforcement des surfaces enduites des courroies pour presses à pinçage prolongé

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## Description

### Background of the Invention

### Field of the Invention

The present invention relates to mechanisms for extracting water from a web of material, and more particularly from a fibrous web being processed into a paper product on a papermaking machine. Specifically, the present invention is an impermeable belt designed for use in conjunction with an long nip press on a papermaking machine.

### Description of the Prior Art

During the papermaking process, a fibrous web is formed on a forming wire by depositing a fibrous slurry thereon. A large amount of water is drained from the slurry during this process, after which the newly formed web proceeds to a press section. The press section includes a series of press nips, in which the fibrous web is subjected to compressive forces designed to remove water therefrom. The web finally proceeds to a drying section which includes heated dryer drums around which the web is directed. The heated dryer drums reduce the water content of the web to a desirable level through evaporation.

Rising energy costs have made it increasingly desirable to remove as much water as possible from the web prior to its entering the dryer section. The dryer drums are often heated from within by steam and related costs can be substantial, especially when a large amount of water needs to be removed from the web.

Traditionally, press sections have included a series of nips formed by pairs of adjacent cylindrical press rollers. Recently, the use of long press nips has been found to be advantageous over the use of nips formed by pairs of adjacent rollers. The longer the web can be subjected to pressure in the nip, the more water can be removed there, and, consequently, the less will remain to be removed through evaporation in the dryer section.

The present invention relates to long nip presses of the shoe type. In this variety of long nip press, the nip is formed between a cylindrical press roller and an arcuate pressure shoe. The latter has a cylindrically concave surface having a radius of curvature close to that of the cylindrical press roller. When roller and shoe are brought into close physical proximity, a nip is formed which can be five to ten times longer in the machine direction than one formed between two press rollers. This increases the so-called dwell time of the fibrous web in the long nip while maintaining the same level of pressure per square inch pressing force used in a two-roller press. The result of this new long nip technology has been a dramatic increase in dewatering of the fibrous web in the long nip when compared to conventional nips on paper machines.

A long nip press of the shoe type requires a special belt, such as that shown in Canadian patent No. 1,188,556. This belt is designed to protect the press fabric supporting, carrying, and dewatering the fibrous web from the accelerated wear that would result from direct, sliding contact over the stationary pressure shoe. Such a belt must be made with a smooth impervious surface that rides, or slides over the stationary shoe on a lubricating film of oil. The belt moves through the nip at roughly the same speed as the press fabric, thereby subjecting the press fabric to minimal amounts of rubbing against stationary components.

Belts of the variety shown in Canadian Patent No. 1,188,556 are made by impregnating a woven base fabric, which takes the form of an endless loop, with a synthetic polymeric resin. Preferably, the resin forms a coating of some predetermined thickness on the inner surface of the belt, so that the yarns from which the base fabric is woven may be protected from direct contact with the arcuate pressure shoe component of the long nip press. It is specifically this coating which must have a smooth, impervious surface to slide readily over the lubricated shoe and to prevent any of the lubricating oil from penetrating the structure of the belt to contaminate the press fabric, or fabrics, and fibrous web.

In practice, during the operation of the long nip press, the coating is subjected to considerable mechanical stress. As the belt takes the form of an endless loop, it is directed through the long press nip by several rollers, each of which serve to flex the belt, thereby subjecting the coating to a repeated stress that may ultimately lead to cracking. At the same time, contact with foreign objects may damage the coating during the normal operation of the belt on the papermachine.

EP-A1-0 396 035 discloses a belt for papermaking machines. The belt includes a flexible belt layer impermeable to liquids and is smooth on its backside while its frontside integrates, but only partly, a support track having cavities. The belt also contains longitudinal threads extending in the direction of advance and located between the support track and the backside of the belt. The longitudinal threads provide a longitudinal reinforcement for the belt as a whole, and are not intended or provided to reinforce the coating, as are those of the present invention.

The present invention provides a solution to the aforementioned problems in the form of a surface reinforcement for the coated surfaces of long nip press belts.

### Summary of the Invention

The present invention is directed toward a belt on a long nip press for dewatering a fibrous web according to Claim 1, and a method for making the belt according to Claim 10.

With reference first to the structure of the belt of the invention, the belt comprises a base fabric which takes the form of an endless loop as a result of having been

woven in endless form, or of having been flat woven and joined into endless form with a seam. The base fabric may be a woven fabric of single or multiple layers comprising monofilament yarns of a synthetic polymeric resin.

At least the inner surface of the base fabric is coated with a polymeric resin, which impregnates the fabric and renders it impervious to fluids, particularly to the oil used to lubricate the arcuate pressure shoe component of the long nip press.

In the present invention, the coating is reinforced with a flexible layer of reinforcing fiber material encapsulated therewithin.

The reinforcing fiber material comprises filaments, rather than staple fibers, and may be a woven sheet of such filaments, or one or more layers of filaments disposed adjacent and substantially parallel to one another. The reinforcing fiber material, that is, the reinforcement, renders the coating less susceptible to cracking and to damage from foreign objects while the belt is in use on the long nip press.

With reference now to the method for manufacturing the belt of the present invention, the method includes providing a base fabric having the form of an endless loop with an inner surface and an outer surface. One then applies a coating of polymeric resin on at least one of the inner and outer surfaces of the base fabric. Specifically, the coating is applied to that surface of the base fabric which will be on the inside of the belt in its endless loop form at the conclusion of the manufacturing process. Typically, this will be the inner surface of the base fabric in endless loop form, although it may be the outer surface where the base fabric is of sufficient length to be inverted, or turned inside-out, at the conclusion of the manufacturing process.

In either case, the base fabric is coated with polymeric resin to a thickness less than the customary finished coated thickness of an long nip press belt. At that point the coating process is interrupted while the flexible layer of reinforcing fiber material is disposed on the coating of polymeric resin. The coating process is then resumed, encapsulating the flexible layer of reinforcing fiber material within the polymeric resin being used, until the desired belt thickness is reached. After the polymeric resin coating is cured, it may be ground to provide the belt with a smooth surface and a uniform thickness.

The flexible layer of reinforcing fiber material may comprise elongated filaments of plastic, that is, of a synthetic polymeric resin extruded into filament form, or of metal in the form of braided strands of fine wire. In general, the reinforcing fiber material must have a higher tensile strength than the coating material, and must be at least as flexible as that material.

The present invention will now be described in greater detail below, with frequent reference being made to the figures, which are listed and identified as follows.

Brief Description of the Drawings

Figure 1 is a side elevational view of a long press nip for which the belt of the present invention has been designed.

Figure 2 is a partially sectioned front view of the press nip shown in Figure 1.

Figure 3 is a sectional side elevational view of the belt of the present invention.

Figure 4 is a sectional side elevational view of an alternate embodiment of the belt of the present invention.

Figure 5 is a plan view of a braided strand of fine metal wire finding application in an embodiment of the present invention.

Detailed Description of the Preferred Embodiment

A long nip press for dewatering a fibrous web being processed into a paper product on a paper machine is shown in Figures 1 and 2. The press nip 10 is defined by a smooth cylindrical press roller 12, an arcuate pressure shoe 14, and a belt 16 of the present invention arranged such that it bears against the surface of the cylindrical press roller 12. The arcuate pressure shoe 14 has about the same radius of curvature as the cylindrical press roller 12. The distance between the cylindrical press roller 12 and the arcuate pressure shoe 14 may be adjusted by means of conventional hydraulic or mechanical apparatus, which is not shown, connected to rod 18 pivotally secured to arcuate pressure shoe 14. The rod 18 may also be actuated to apply the desired pressure to the arcuate pressure shoe 14. It will be appreciated that the cylindrical press roller 12 and the arcuate pressure shoe 14 described above and shown in Figures 1 and 2 are conventional in the art.

As shown in Figures 1 and 2 are a first papermaker's wet press fabric 26, a second papermaker's web press fabric 27, and a fibrous web 24 being processing into a paper sheet. The motions of the belt 16, the fibrous web 24, the first papermaker's web press fabric 26, and the second papermaker's web press fabric 27 through the press nip 10 are upward in Figure 1. Lubricating means 28 in Figure 1 dispenses oil onto the side of belt 16 facing arcuate pressure shoe 14 to facilitate its sliding motion thereagainst.

A sectional side elevational view of the belt 16 of the present invention is shown in Figure 3. Belt 16 takes the form of an endless loop of which only a portion is shown in Figure 3. It has an outer surface 19 and an inner surface 20.

The belt 16 includes a base fabric 22 which takes the form of an endless loop. Base fabric 22 can be produced, or woven, in endless form, or can be produced in flat form, such as by flat weaving, and joined into endless form by a seam. Such seaming into endless form should preferably be done before any coating is applied to the belt.

Base fabric 22 may be woven from monofilament

yarns of a synthetic polymeric resin such as polyester, polyamide, or polyethylene terephthalate (PET) in the same manner as other fabrics used in the papermaking industry are woven. Base fabric 22 includes machine-direction yarns 30 and cross-machine direction yarns 32, so-called because of the directions they assume relative to the papermachine when belt 16 has been installed thereon. The base fabric 22 may be of a single- or multi-layer weave.

Base fabric 22 is of a weave sufficiently open to permit complete impregnation thereof by the polymeric resin coating material 34. Complete impregnation eliminates the possibility of undesirable voids forming in the finished belt 16. Voids are particularly undesirable because they may allow the lubricating oil used between the belt 16 and the arcuate pressure shoe 14 to pass through the belt 16 and contaminate the press fabric, or fabrics, and fibrous web being processed into paper.

The polymeric resin coating 34 is applied to at least one surface of the base fabric 22, that surface being the one which will ultimately be the inner surface 20 of the endless loop of belt 16. As the inner surface 20 slides across the lubricated arcuate pressure shoe 14, the polymeric resin coating 34 protects the base fabric 22 from such sliding contact and the wear by abrasion that would otherwise result. The polymeric resin coating material 34 may be polyurethane, and is preferably a 100% solid composition to avoid the formation of bubbles during the curing process, through which the polymeric resin coating material 34 proceeds following its application upon the base fabric 22.

A polymeric resin coating 34 such as this undergoes considerable punishment during the operation of the belt 16 on a papermachine. Cracking of the polymeric resin coating 34 may follow from the repeated flexing of the belt 16 as it passes through the press nip 10 and around the machine components which guide and control its motion. Damage to the polymeric resin coating 34 may also be caused by contact with foreign objects while the belt 16 is in use on the papermachine. In the present invention, the polymeric resin coating 34 is reinforced to protect it from cracking and other damage, both of which may considerably shorten the useful life of the belt on the papermachine.

The polymeric resin coating 34 is reinforced by encapsulating therewithin a flexible layer of reinforcing fiber material. In the embodiment shown in Figure 3, the flexible layer 36 is a sheet woven from filaments of reinforcing fiber material. The filaments themselves may be monofilaments of a synthetic polymeric resin such as polyester, polyamide, or polyethylene terephthalate (PET), and are finer than the monofilaments used in the weaving of base fabric 22. In general, the reinforcing fiber material must have a higher tensile strength than the polymeric resin coating material 34, and must be at least as flexible as that material.

In an alternate embodiment of belt 16 of the present invention shown in a sectional side elevational view in Figure 4, where elements identical to those of the embodiment shown in Figure 3 are identified with the same reference numerals, the flexible layer 36 of reinforcing fiber materials comprises two layers of elongated filaments 38, one of said layers being in the machine-direction, the other in the cross-machine direction. In each layer, the elongated filaments 38 are disposed adjacent and substantially parallel to one another. The flexible layer 36 of reinforcing fiber material may alternatively comprise one layer of elongated filaments 38 or more than two layers of such filaments. For example, the flexible layer 36 of reinforcing fiber material may comprise one layer of elongated filaments 38, wherein the elongated filaments 38 comprise braided strands of fine metal wire wound spirally around the belt 16 substantially in the machine direction within the polymeric resin coating material 34. Such a braided strand 40 of fine metal wire 42 is shown in Figure 5.

The belts 16 of the present invention are manufactured according to technology known in the art by providing a base fabric 22 of the variety described above, and by applying a polymeric resin coating 34 on at least one surface of base fabric 22 to a thickness less than the final thickness desired for the finished belt 16. At that point, the coating process is interrupted, and the flexible layer 36 of reinforcing fiber material is applied to the partially coated base fabric 22. Because the polymeric resin coating 34 is at this point not cured, the flexible layer 36 of reinforcing fiber material may readily adhere thereto. Then, the coating process is resumed, thereby encapsulating the flexible layer 36 within the polymeric resin coating 34 and providing the belt 16 with its final desired thickness. The polymeric resin coating 34 is then cured, and the cured polymeric resin coating 34 is ground to provide the belt 16 with a smooth surface and uniform thickness.

It should be clear that modifications to the above would be obvious to anyone skilled in the art without departing from the scope of the claims appended hereto.

**Claims**

1. A belt (16) on a long nip press for dewatering a fibrous web (24), said long nip press having a cylindrical press roller (12) and an arcuate pressure shoe (14) which together define a nip (10) therebetween, said belt (16) being passed through said nip (10) in conjunction with at least one press fabric (26, 27) supporting and carrying said fibrous web (24) to be dewatered between said press fabric (26, 27) and said arcuate pressure shoe (14), said belt (16) therefore having a shoe side and a fabric side, said belt (16) comprising:

   a base fabric (22) in the form on an endless loop having an inner surface (20) and outer surface (19), said inner surface (20) being on said shoe

side of said belt (16) and said outer surface (19) being on said fabric side of said belt (16), said base fabric (22) having machine-direction and cross-machine direction yarns (30, 32) and being a fabric woven therefrom, said machine-direction being around said loop and said cross-machine direction being across said loop; and

a coating (34) on at least said inner surface (20) of said base fabric (22), said coating impregnating and rendering said base fabric (22) impervious to liquids, said coating being smooth and providing said belt (16) with a uniform thickness, **characterised in that** said coating is a coating of a polymeric resin and is reinforced with a flexible layer (36) of reinforcing fiber material separate from and spaced from said base fabric (22), said reinforcing fiber material including elongated filaments (38) finer than said machine-direction (30) and cross-machine direction yarns (32) of said base fabric (22) and said flexible layer (36) of reinforcing fiber material being encapsulated within said coating, so that said coating may be less susceptible to cracking and to damage from foreign objects while said belt (16) is in use on said long nip press.

2. A belt (16) on a long nip press as claimed in claim 1 wherein said polymeric resin (34) is polyurethane.

3. A belt (16) on a long nip press as claimed in claim 1 wherein said base fabric (22) is a multi-layer fabric.

4. A belt (16) on a long nip press as claimed in claim 1 wherein said machine-direction and cross-machine direction yarns (30, 32) are monofilaments of a synthetic polymeric resin (34) selected from the group consisting of polyester and polyamide resins.

5. A belt (16) on a long nip press as claimed in claim 1 wherein said flexible layer (36) of reinforcing fiber material is a sheet woven from said elongated filaments (38).

6. A belt (16) on a long nip press as claimed in claim 1 wherein said flexible layer (36) of reinforcing fiber material is a single layer of said elongated filaments (38) disposed adjacent and substantially parallel to one another.

7. A belt (16) on a long nip press as claimed in claim 1 wherein said flexible layer (36) of reinforcing fiber material includes more than one layer of said elongated filaments (38), said elongated filaments (38) in each of said layers being disposed adjacent and substantially parallel to one another.

8. A belt (16) on a long nip press as claimed in claim 1 wherein said elongated filaments (38) of said flexible layer (36) of said reinforcing fiber material are monofilaments of a synthetic polymeric resin (34) selected from the group consisting of polyester and polyamide resins.

9. A belt (16) on a long nip press as claimed in claim 1 wherein said elongated filaments of said flexible layer (36) of said reinforcing fiber material are braided strands (40) of fine metal wire (42).

10. A method for manufacturing a belt (16) for use on a long nip press for dewatering a fibrous web (24) comprising:

providing a base fabric (22) having the form of an endless loop with an inner surface (20) and an outer surface (19) and having lengthwise and crosswise yarns; and

coating at least one of said inner and outer surfaces (19) of said base fabric (22) with a coating material (34) to impregnate said base fabric (22) and to form a layer of said coating material (34) thereon,

**characterised** in that said coating material is a polymeric resin, the method further comprising the following steps:

disposing a flexible layer (36) of reinforcing fiber material on said layer of said polymeric resin (34), said flexible layer (36) being separate from and spaced from said base fabric (22), and said reinforcing fiber material including elongated filaments (38) finer than said lengthwise and crosswise yarns of said base fabric (22);

coating said flexible layer (36) of reinforcing fiber material on said layer of said polymeric resin (34) with more of said polymeric resin (34) to encapsulate said flexible layer (36) of reinforcing fiber material within said polymeric resin and to provide said belt (16) with a desired thickness;

curing said polymeric resin (34); and

grinding said cured polymeric resin (34) to provide said belt (16) with a smooth surface and a uniform thickness.

11. The method as claimed in claim 10 wherein said polymeric resin (34) is polyurethane.

12. The method as claimed in claim 10 wherein said base fabric (22) is a woven fabric.

13. The method as claimed in claim 10 wherein said base fabric (22) is a multi-layer fabric.

14. The method as claimed in claim 10 wherein said base fabric (22) is woven endless.

15. The method as claimed in claim 10 wherein said base fabric (22) is flat-woven and joined into the form of an endless loop with a seam.

16. The method as claimed in claim 10 wherein said flexible layer (36) of reinforcing fiber material is a sheet woven from elongated filaments (38).

17. The method as claimed in claim 10 wherein said flexible layer (36) of reinforcing fiber material is a single layer of elongated filaments (38) disposed adjacent and substantially parallel to one another.

18. The method as claimed in claim 10 wherein said flexible layer (36) of reinforcing fiber material includes more than one layer of elongated filaments (38), said elongated filaments (38) in each of said layers being disposed adjacent and substantially parallel to one another.

19. The method as claimed in claim 10 wherein said reinforcing fiber material includes monofilaments of a synthetic polymeric resin (34) selected from a group consisting of polyester and polyamide resins.

20. The method as claimed in claim 10 wherein said reinforcing fiber material includes braided strands (40) of fine metal wire (42).

**Patentansprüche**

1. Band (16) an einer Langspaltpresse zum Entwässern einer Faserbahn (24), wobei die Langspaltpresse eine zylindrische Preßwalze (12) und einen bogenförmigen Druckschuh (14) aufweist, die zusammen einen Spalt (10) dazwischen bilden, wobei das Band (16) zusammen mit wenigstens einem Preßgewebe (26,27), das die zu entwässernde Faserbahn (24) zwischen dem Preßgewebe (26,27) und dem bogenförmigen Druckschuh (14) hält und trägt, durch den Spalt (10) geleitet wird, wobei das Band (16) daher eine Schuhseite und eine Gewebeseite aufweist, wobei das Band (16) umfaßt:

   ein Grundgewebe (22) in Form einer Endlosschleife mit einer Innenfläche (20) und einer Außenfläche (19), wobei sich die Innenfläche (20) an der Schuhseite des Bandes (16) befindet und sich die Außenfläche (19) an der Gewebeseite des Bandes (16) befindet, wobei das Grundgewebe (22) Garne in Laufrichtung und quer zur Laufrichtung (30,32) aufweist und ein daraus gewebtes Gewebe ist, wobei die Laufrichtung um die Schleife herum verläuft und die Richtung quer zur Laufrichtung quer zu der Schleife verläuft; und

   eine Beschichtung (34) wenigstens auf der Innenfläche (20) des Grundgewebes (22), wobei die Beschichtung das Grundgewebe (22) durchtränkt und es für Flüssigkeiten undurchlässig macht, wobei die Beschichtung glatt ist und dem Band (16) eine einheitliche Dicke verleiht,

   **dadurch gekennzeichnet,** daß die Beschichtung eine Beschichtung aus einem Polymerharz ist und mit einer flexiblen Schicht (36) aus verstärkendem Fasermaterial verstärkt ist, das von dem Grundgewebe (22) getrennt und beabstandet ist, wobei das verstärkende Fasermaterial längliche Endlosfasern (38) enthält, die dünner sind als die Garne des Grundgewebes (22) in der Laufrichtung (30) und quer zur Laufrichtung (32), und die flexible Schicht (36) aus verstärkendem Fasermaterial in der Beschichtung eingeschlossen ist, so daß die Beschichtung weniger anfällig für Bruch und Beschädigung durch Fremdkörper während der Funktion des Bandes (16) an der Langspaltpresse sein kann.

2. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei das Polymerharz (34) Polyurethan ist.

3. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei das Grundgewebe (22) ein Mehrschichtgewebe ist.

4. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei die Garne (30,32) in der Laufrichtung und quer zur Laufrichtung Monofilamente aus einem synthetischen Polymerharz (34) sind, das aus der Gruppe ausgewählt wird, die aus Polyester- und Polyamidharzen besteht.

5. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei die flexible Schicht (36) aus verstärkendem Fasermaterial eine aus den länglichen Endlosfasern (38) gewebte Bahn ist.

6. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei die flexible Schicht (36) aus verstärkendem Fasermaterial eine einzelne Schicht der länglichen Endlosfasern (38) ist, die aneinandergrenzend und im wesentlichen parallel zueinander angeordnet sind.

7. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei die flexible Schicht (36) aus verstärkendem Fasermaterial mehr als eine Schicht der länglichen Endlosfasern (38) enthält, wobei die länglichen Endlosfasern (38) in jeder der Schichten aneinandergrenzend und im wesentlichen parallel zueinander angeordnet sind.

8. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei die länglichen Endlosfasern (38) der flexiblen Schicht (36) aus verstärkendem Fasermaterial Monofilamente aus einem synthetischen Polymerharz (34) sind, das aus der Gruppe ausgewählt wird, die aus Polyester- und Polyamidharzen besteht.

9. Band (16) an einer Langspaltpresse nach Anspruch 1, wobei die länglichen Endlosfasern der flexiblen Schicht (36) aus verstärkendem Fasermaterial geflochtene Stränge (40) aus feinem Metalldraht (42) sind.

10. Verfahren zum Herstellen eines Bandes (16) zum Einsatz an einer Langspaltpresse zum Entwässern einer Faserbahn (24), das umfaßt:

Bereitstellen eines Grundgewebes (22) in Form einer Endlosschleife mit einer Innenfläche (20) und einer Außenfläche (19), das Längs- und Quergarne aufweist; und

Beschichten wenigstens der Innen- oder der Außenfläche (19) des Grundgewebes (22) mit einem Beschichtungsmaterial (34), um das Grundgewebe (22) zu durchtränken und eine Schicht aus dem Beschichtungsmaterial (34) darauf herzustellen, **dadurch gekennzeichnet,** daß das Beschichtungsmaterial ein Polymerharz ist, wobei das Verfahren weiterhin die folgenden Schritte umfaßt:

Auftragen einer flexiblen Schicht (36) aus verstärkendem Fasermaterial auf die Schicht aus Polymerharz (34), wobei die flexible Schicht (36) von dem Grundgewebe (22) getrennt und beabstandet ist und das verstärkende Fasermaterial längliche Endlosfasern (38) enthält, die dünner sind als die Längs- und Quergarne des Grundgewebes (22);

Beschichten der flexiblen Schicht (36) aus verstärkendem Fasermaterial auf der Schicht aus Polymerharz (34) mit weiterem Polymerharz (34), um die flexible Schicht (36) aus verstärkendem Fasermaterial in dem Polymerharz einzuschließen und dem Band (16) eine gewünschte Dicke zu verleihen;

Aushärten des Polymerharzes (34); und

Schleifen des ausgehärteten Polymerharzes (34), um dem Band (16) eine glatte Oberfläche und eine einheitliche Dicke zu verleihen.

11. Verfahren nach Anspruch 10, wobei das Polymerharz (34) Polyurethan ist.

12. Verfahren nach Anspruch 10, wobei das Grundgewebe (22) ein Gewebe ist.

13. Verfahren nach Anspruch 10, wobei das Grundgewebe (22) ein Mehrschichtgewebe ist.

14. Verfahren nach Anspruch 10, wobei das Grundgewebe (22) endlos gewebt ist.

15. Verfahren nach Anspruch 10, wobei das Grundgewebe (22) flach gewebt und mit einer Naht in die Form einer Endlosschleife verbunden wird.

16. Verfahren nach Anspruch 10, wobei die flexible Schicht (36) aus verstärkendem Fasermaterial eine aus länglichen Endlosfasern (38) gewebte Bahn ist.

17. Verfahren nach Anspruch 10, wobei die flexible Schicht (36) aus verstärkendem Fasermaterial eine einzelne Schicht länglicher Endlosfasern (38) ist, die aneinandergrenzend und im wesentlichen parallel zueinander angeordnet sind.

18. Verfahren nach Anspruch 10, wobei die flexible Schicht (36) aus verstärkendem Fasermaterial mehr als eine Schicht länglicher Endlosfasern (38) enthält, wobei die länglichen Endlosfasern (38) in jeder der Schichten aneinandergrenzend und im wesentlichen parallel zueinander angeordnet sind.

19. Verfahren nach Anspruch 10, wobei das verstärkende Fasermaterial Monofilamente aus einem synthetischen Polymerharz (34) enthält, das aus einer Gruppe ausgewählt wird, die aus Polyester- und Polyamidharzen besteht.

20. Verfahren nach Anspruch 10, wobei das verstärkende Fasermaterial geflochtene Stränge (40) aus feinem Metalldraht (42) enthält.

**Revendications**

1. Courroie (16) placée sur une presse à longue emprise pour la déshydratation d'une nappe fibreuse (24), la presse à longue emprise ayant un cylindre (12) de pressage et un patin courbe (14) de pression qui délimitent ensemble une emprise (10) entre eux, la courroie (16) passant dans l'emprise (10) avec au moins une étoffe de pressage (26, 27) supportant et transportant la nappe fibreuse (24) à déshydrater entre l'étoffe de pressage (26, 27) et le patin courbe (14) de pression, la courroie (16) ayant ainsi un côté tourné vers le patin et un côté tourné vers l'étoffe, la courroie (16) comprenant :

une étoffe de base (22) sous forme d'une boucle sans fin ayant une surface interne (20) et une

surface externe (19), la surface interne (20) étant placée du côté du patin de la courroie (16) et la surface externe (19) étant placée du côté de l'étoffe de la courroie (16), l'étoffe de base (22) ayant des fils dans la direction de la machine et en direction transversale (30, 32) et étant une étoffe tissée avec ces fils, la direction de la machine correspondant à la longueur de la boucle et la direction transversale étant transversale à la boucle, et
un revêtement (34) formé au moins à la surface interne (20) de l'étoffe de base (22), le revêtement imprégnant l'étoffe de base (22) et la rendant imperméable aux liquides, le revêtement étant lisse et donnant à la courroie (16) une épaisseur uniforme,
caractérisée en ce que le revêtement est un revêtement d'une résine polymère et est renforcé par une couche flexible (36) d'une matière fibreuse de renforcement séparée de l'étoffe de base (22) et distante de celle-ci, la matière fibreuse de renforcement contenant des filaments allongés (38) plus fins que les fils de l'étoffe de base (22) placés dans la direction de la machine (30) et en direction transversale (32), et la couche flexible (36) de la matière fibreuse de renforcement étant encapsulée dans le revêtement, si bien que le revêtement peut être moins sensible à la fissuration et à la détérioration par les objets étrangers lorsque la courroie (16) est utilisée sur la presse à longue emprise.

2. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle la résine polymère (34) est un polyuréthane.

3. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle l'étoffe de base (22) est une étoffe multicouche.

4. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle les fils (30, 32) placés dans la direction de la machine et en direction transversale sont des monofilaments d'une résine polymère de synthèse (34) choisie dans le groupe qui comprend les résines polyester et polyamide.

5. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle la couche flexible (36) de la matière fibreuse de renforcement est une feuille tissée à partir des filaments allongés (38).

6. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle la couche flexible (36) de la matière fibreuse de renforcement est une couche unique de filaments allongés (38) qui sont adjacents les uns aux autres et pratiquement parallèles les uns aux autres.

7. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle la couche flexible (36) de la matière fibreuse de renforcement comprend plus d'une couche de filaments allongés (38), les filaments allongés (38) de chacune des couches étant placés les uns près des autres et en directions pratiquement parallèles les uns aux autres.

8. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle les filaments allongés (38) de la couche flexible (36) de la matière fibreuse de renforcement sont des monofilaments d'une résine polymère de synthèse (34) choisie dans le groupe formé par les résines de polyester et de polyamide.

9. Courroie (16) de presse à longue emprise selon la revendication 1, dans laquelle les filaments allongés de la couche flexible (36) de la matière fibreuse de renforcement sont des brins tressés (40) de fins fils métalliques (42).

10. Procédé de fabrication d'une courroie (16) destinée à être utilisée sur une presse à longue emprise pour la déshydratation d'une nappe fibreuse (24), comprenant :

la disposition d'une étoffe de base (22) ayant la forme d'une boucle sans fin possédant une surface interne (20) et une surface externe (19) et ayant des fils longitudinaux et transversaux, et le revêtement de l'une au moins des surfaces interne et externe (19) de l'étoffe de base (22) à l'aide d'une matière de revêtement (34) pour l'imprégnation de l'étoffe de base (22) et pour la formation d'une couche de la matière de revêtement (34),
caractérisé en ce que la matière de revêtement est une résine polymère, le procédé comprenant en outre les étapes suivantes :
la disposition d'une couche flexible (36) d'une matière fibreuse de renforcement sur la couche de résine polymère (34), la couche flexible (36) étant séparée de l'étoffe de base (22) et distante de celle-ci, et la matière fibreuse de renforcement comprenant des filaments allongés (38) plus fins que les fils longitudinaux et transversaux de l'étoffe de base (22),
le revêtement de la couche flexible (36) de la matière fibreuse de renforcement sur la couche de la résine polymère (34) avec une plus grande quantité de la résine polymère (34) afin que la couche flexible (36) de la matière fibreuse de renforcement soit encapsulée dans la résine polymère et donne à la courroie (16) une épaisseur voulue,

la polymérisation de la résine polymère (34), et le meulage de la résine polymère polymérisée (34) afin que la courroie (16) ait une surface lisse et une épaisseur uniforme.

11. Procédé selon la revendication 10, dans lequel la résine polymère (34) est un polyuréthane (12).

12. Procédé selon la revendication 10, dans lequel l'étoffe de base (22) est une étoffe tissée.

13. Procédé selon la revendication 10, dans lequel l'étoffe de base (22) est une étoffe à plusieurs couches.

14. Procédé selon la revendication 10, dans lequel l'étoffe de base (22) est une étoffe tissée sans fin.

15. Procédé selon la revendication 10, dans lequel l'étoffe de base (22) est tissée à plat et est raccordée sous forme d'une boucle sans fin par une couture.

16. Procédé selon la revendication 10, dans lequel la couche flexible (36) de la matière fibreuse de renforcement est une feuille tissée à partir de filaments allongés (38).

17. Procédé selon la revendication 10, dans lequel la couche flexible (36) de la matière fibreuse de renforcement est une couche unique de filaments allongés (38) qui sont adjacents les uns aux autres et pratiquement parallèles les uns aux autres.

18. Procédé selon la revendication 10, dans lequel la couche flexible (36) de la matière fibreuse de renforcement contient plus d'une couche de filaments allongés (38), les filaments allongés (38) de chacune des couches étant adjacents les uns aux autres et pratiquement parallèles les uns aux autres.

19. Procédé selon la revendication 10, dans lequel la matière fibreuse de renforcement comprend des monofilaments d'une résine polymère de synthèse (34) choisie dans le groupe formé des résines polyester et polyamide.

20. Procédé selon la revendication 10, dans lequel la matière fibreuse de renforcement contient des brins tressés (40) de fins fils métalliques (42).

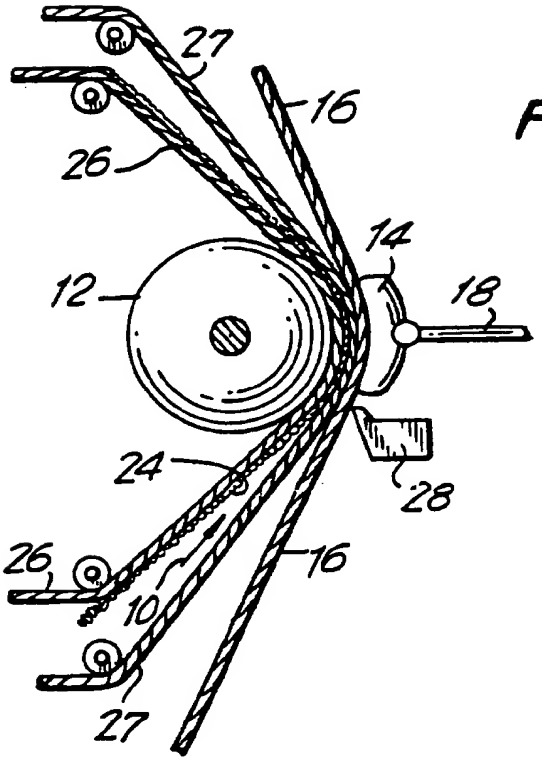


FIG. 1

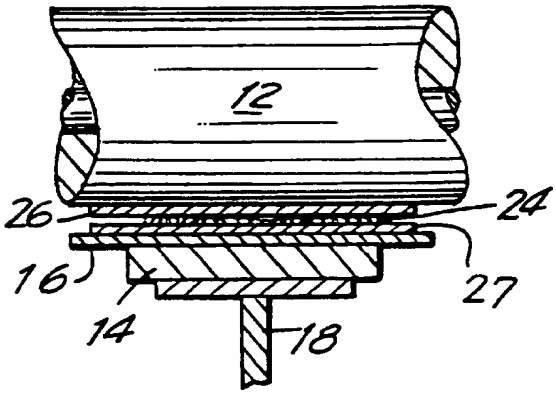


FIG. 2

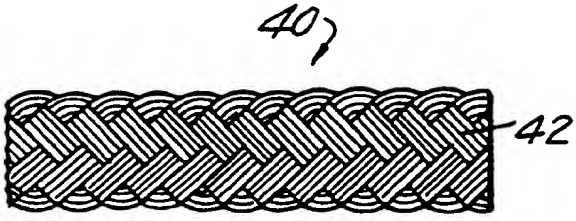


FIG. 5

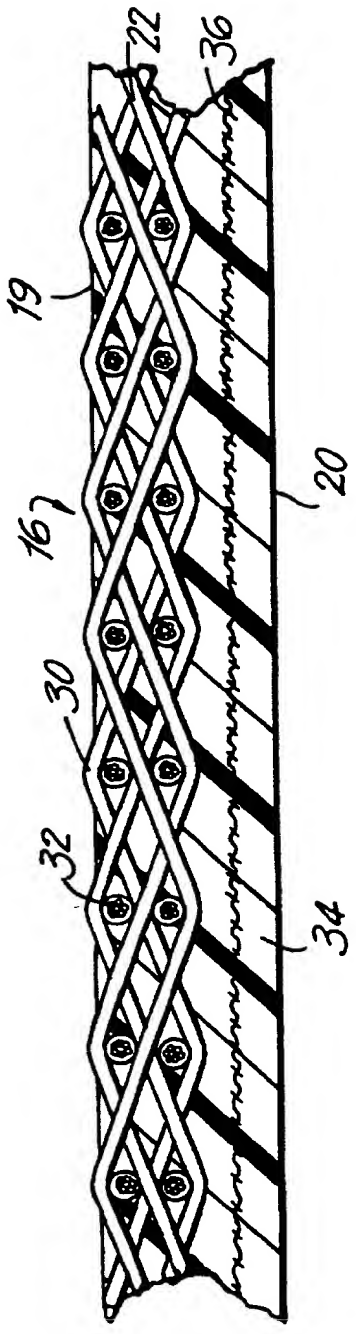


FIG. 3

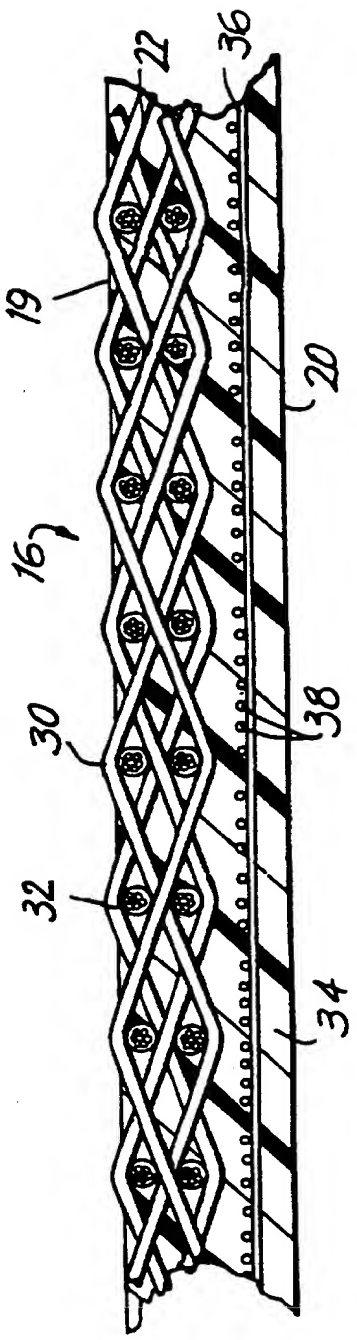


FIG. 4